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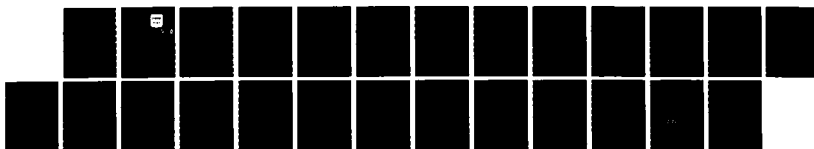
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STUDENT ESSAY

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TRAINING DEVICE STRATEGY

BY

LIEUTENANT COLONEL LAWRENCE B. GOODWIN, JR., IN

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US ARMY WAR COLLEGE, CARLISLE BARRACKS, PENNSYLVANIA

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USAWC MILITARY STUDIES PROGRAM PAPER

TRAINING DEVICE STRATEGY

AN INDIVIDUAL ESSAY

by

Lieutenant Colonel Lawrence B. Goodwin, Jr., IN

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Project Adviser

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US Army War College
Carlisle Barracks, Pennsylvania 17013
24 APRIL 1986

ABSTRACT

AUTHOR: Lawrence B. Goodwin, Jr., LTC, IN

TITLE: Training Device Strategy

FORMAT: Individual Essay

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The escalating costs and proliferation of training devices and simulators have caused training and scheduling problems for commanders and have resulted in some devices not being utilized to the degree expected. In other cases devices have not been developed properly and are not good trainers. Some actions must be taken by the Army to correct these real and/or perceived shortfalls. Strategies must be articulated for the development and management of devices and devices must fit into the training strategies for weapons systems. US Army Training and Doctrine Command (TRADOC) must direct the enhanced management system and in coordination with US Army Materiel Command (AMC) enforce the developmental expectations and requirements. Devices are here to stay and the Army must take advantage of them in order to realize the potential for cost savings and training enhancements.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) <p>→ The escalating costs and proliferation of training devices and simulators have caused training and scheduling problems for commanders and have resulted in some devices not being utilized to the degree expected. In other cases devices have not been developed properly and are not good trainers. Some actions must be taken by the Army to correct these real and/or perceived shortfalls. Strategies must be articulated for the development and management (continued)</p>		

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of devices and devices must fit into the training strategies for weapons systems. US Army Training and Doctrine Command (TRADOC) must direct the enhanced management system and in coordination with US Army Material Command (AMC) enforce the developmental expectations and requirements. Devices are here to stay and the Army must take advantage of them in order to realize the potential for cost savings and training enhancements.

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TRAINING DEVICE STRATEGY

The rapidly escalating initial costs and the inherent operational and sustainment costs of military equipment are driving most commanders into alternative training methods. For many years an alternative was to stop training when ammunition or fuel became scarce. I can remember in one division where I commanded a Combat Support Company during a fuel shortage crisis, the units were required to walk to all training to include a large Brigade size tactical operation. While this was still good training for the Infantry soldier, to include the mortar platoons and 106 Recoilless Rifle Platoons, it was unrealistic to the units that required greater mobility than walking to accomplish their mission. Additionally, prolonged training with man packed mortars and 106 Recoilless Rifles would be too physically demanding, demoralizing and unrealistic. The units that suffered the most in this particular division during that fuel crisis were aviation, artillery, engineer and support.

Today, alternatives to scarce resources are training devices and simulators and throughout this article these terms will be used interchangeably. While devices can't solve all the training problems encountered during a fuel shortage crisis, they may solve some of the problems and better support today's Army of tight resources. Training devices have been around the Army for years and in some cases the old devices train as well today as when first developed. An example is the Trainer, Mortar, Pneumatic which was fielded in the early 1960's and is at use today in many National Guard Armories and in active units where a training officer or a noncommissioned officer (NCO) has bothered to

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visit the Training and Audiovisual Support Center (TASC) and signed out this old, not so fancy but effective device.¹ When properly used the pneumatic firing device provides training for the entire indirect fire team. It can be used indoors or out and should be used for sustainment training between live fire training exercises. There are numerous new simulators available and these include devices that train simple, individual tasks to those that train elaborate collective tasks. An example of a simple device to train an individual task is the DVC 07-26 M-16 Sighting Device for M-16 marksmanship training. It is a 7 inch by 4 inch cardboard device to assist a firer in establishing a correct sight picture. It has a movable front sight and a movable aiming point on one side and on the other side pictures that show correct sight alignment and placement of the aiming point.² It can be used in institutional and unit rifle marksmanship programs and costs \$1.00.

On the other extreme the Unit Conduct of Fire Trainer (U-COFT) for the M2/3 Bradley Fighting Vehicle is a very complex and expensive crew trainer. It is a semipermanent, self-contained training simulator consisting of a commander/gunner station, an instructor/operator station and a computer/visual generation subsystem. Training software is designed to move the gunner/commander through an exercise matrix where each exercise becomes progressively more difficult depending on the learning ability and performance of the individuals being trained. The crew station is an exact replica of the Bradley Fighting Vehicle turret with all controls simulated. The instructor/operator controls and monitors all training while the crew is in the trainer and critiques the crew using the computer printouts of their performance and his observations.³ The simulator is being procured so that each Bradley

Battalion/Squadron has one and presently costs an estimated \$2 million each.

There are hundreds of training devices throughout the Army. The M-16 Sighting Device may be one of the less expensive and the U-COFT one of the more expensive. However, cost alone does not ensure trainability, usability or even effectiveness. Additionally, devices not used or used incorrectly may either fail to resolve training problems or even subvert the training required. The purpose of this paper is to discuss these training resources, their inherent problems and propose a solution to enhance training and improve readiness.

As stated there are many devices already procured and in the inventory. Some are the only devices to train a particular task while others may be one of several devices that can train the same task(s). A challenge is the selection of the right device to do the training job and identify and articulate the proper strategy for using the device in training the task(s). For example, there are various devices available for training Bradley Fighting Vehicle gunnery. Without going into detail about these devices they can be broadly identified as "part task" trainers which train only some individual gunner tasks of the total number of tasks required for proficiency or "full task" trainers that train all the gunnery tasks for the commander/gunner. There are other weapon systems that also have more than one training device, i.e., M60 and M1 tanks and even the M16 Rifle. Additionally, at this time more devices are being developed, tested and procured to train new tasks or train tasks for which there are already devices available. Redundancy in devices to train the same task is not new to our Army and is not

necessarily bad. However, redundancy should probably be avoided unless there is strong evidence that significant gains in training can be made through the use of the new device.

Reasons for developing and/or procuring redundant devices may be to take advantage of a new technology, overcome a shortage of other trainers or to integrate different types of devices into a training strategy that would be more cost effective overall. A problem facing the service schools responsible for developing new devices is the rapid growth of technology that can almost make a new device obsolete before it can be fielded. Any device based on computer technology can easily fall into this category. For example, the rapid advances in computer generated imagery have made the imagery in the U-COFT almost one generation behind what is now available. Another reason for redundancy is purely cost related. While the U-COFT is generally considered the overall best gunnery device for Tank and Bradley gunnery, the cost prohibits any greater proliferation than one per battalion. With the development and fielding of other devices such as the proposed Video Disc Gunnery Simulator, costing an estimated \$40 thousand each, a significant savings can be made in the training of part of the total gunnery tasks and yet provide an easily operated, relatively inexpensive and effective trainer for some tasks. Thus a gunner who needs additional training may not tie up the total U-COFT and prevent crew training if the VIGS can train his particular shortfall. There are other devices for different systems that could fill the same role.

Training devices should not be categorized as only resource savers. Devices and simulators should first be considered training enhancers or development and procurement should be reconsidered. However,

realistically, training devices have historically been procured to save resources. It is up to the developer to ensure devices and simulators enhance the training as well as save money. Recently there has been concern about the operation and sustainment (O and S) costs for all tracked and most wheeled vehicles. Immediately it was thought that a driver trainer would significantly cut the O and S costs and yet maintain or even improve the skills of drivers. The cost savings would be realized through reduced fuel consumption, wear and tear, and maintenance costs because the vehicles would be parked and the driver would use the simulator. Many of our allies already have such trainers and are very positive about their use. However, we may not have the same problem as they. For example, we are not as limited in driver training areas as the highly populated European countries. Also, the size of our Army combined with the extended distances between units would require us to procure a large number of driver trainers if regular sustainment training in units is to take place. And then the probability of savings would be questionable if "full blown" trainers were bought that give the same training fidelity as for example, the current flight trainers we now have. Some educators believe that simulators should train to the same fidelity as the actual weapons system or its value as a training enhancer is suspect. Presently, some West European armies have driver trainers for tracked vehicles that simulate performance very similar to their combat vehicle. When the trainee enters the simulated driver's compartment he is surrounded by the exact environment that he would find in the actual vehicle. He then drives the "vehicle" over terrain simulated on a terrain board and a small television camera moves along the route of travel and projects the

terrain image to the drivers vision blocks. His compartment bounces, rocks, tilts, etc., as if traveling over the real ditches, holes and other normal terrain his vehicle would usually traverse when performing it's mission. Additionally, there are sound effects to add to the realism. This type trainer for tracked vehicles costs about \$2 million. To use computer generated imagery the cost increases significantly to about \$3.5 to \$4 million. For relatively small armies with centralized training facilities those rather expensive devices may over time realize cost savings. But in the US Army where units and not centralized training facilities are responsible for most initial training and licensing, the number of driver trainers required may prohibit the real intent which is to realize a cost savings. It may be more practical to slightly raise the OPTEMPO, as opposed to lowering the OPTEMPO as is the current trend, and rely on trips to the ranges, training exercises and required maintenance to sustain our drivers. We may also realize a savings by changing our practice of licensing in units to licensing at centralized locations where a few of the expensive driver trainers would be available, i.e., basic training, service schools, Fort Hood, etc. This would cut back on the usual wear and tear of inexperienced drivers damaging actual vehicles yet give the new drivers ample initial experience. Commanders would not like losing the flexibility of licensing their own drivers, and I can easily see where normal personnel turbulence could cause great problems for the commander unless the licensing training on the centralized simulators were intensely managed to ensure maximum support to units. Also, the assignments of combat vehicle drivers would have to be closely managed to ensure each vehicle gets a "school trained" driver. This type personnel management would be

difficult since we already have a hard time managing NCO and junior officer assignments. The driver trainer dilemma, I believe, will not be easily solved.

An example where a device can easily be an enhancer and save money is the Unit-Conduct of Fire Trainer. The cost of Bradley and tank ammunition prohibits live fire gunnery above the few tables now fired. The U-COFT and a few other devices can now provide preliminary and sustainment gunnery with almost the same fidelity as the real weapons system. A proper training strategy would include heavy use of the U-COFT and little live fire. The crew can easily fire enough exercises in a 1-hour U-COFT training session to equal millions of dollars of ammunition which would be totally impossible on a range. Range constraints, target availability, cost of ammunition, supporting personnel and time available preclude such a live fire exercise. In addition the performance of the crew in the U-COFT would be closely monitored by the Master Gunner (instructor/operator) and critiqued immediately following the session without the training distractions normally associated with range firing. In this scenario money and time would be saved and gunnery training would far exceed that available without the training simulator.

Training devices are here to stay because when they are properly developed and used they are training enhancers and cost savers. There are two main players to ensure this occurs. The proponent must develop and procure devices of the right kind and in sufficient numbers to support training, and trainers at all levels must intensely and conscientiously manage their utilization in training to optimize their value.

The training device proponent is usually the proponent of the weapons system for which the device trains, that is the Armor Center is the proponent for the M1 U-COFT. The Project Manager in this case is a member of the staff of the Program Manager of Training Devices which is a subordinate agency of the Army Materiel Command. Regardless, the Armor Center is the agency that tells the Project and Program Manager what is needed and is involved in the development and procurement of the device/simulator from the start to management after fielding. It is the proponent who develops the Training Device Requirement (TDR) need statement and provides the initial impetus to get the long development and procurement process started. The proponent is therefore the one that should have a training strategy for the device before it is even articulated in the TDR. The newly proposed device should either support a new system or be designed to overcome a training shortfall of an existing system. For example, there is concern that the existing trainers for the Dragon Antitank missile system are not effective. Recent attempts have been made to correct this perceived deficiency by the development of a new device incorporating newer technology than that found in the existing trainers. On the other hand it is now standard to have training devices fielded with new systems and not follow after the new equipment is fielded. This concept has strong emphasis throughout the US Army Training and Doctrine Command (TRADOC) and the US Army Materiel Command (AMC) communities and should become expected practice. In the future some systems will have embedded trainers when fielded. This refers to a capability of the actual system to also serve as a trainer with training feedback "built in."

As the proponent participates in the development system, the proposed strategy should be articulated to the user community. The user should then participate in the full developmental cycle to include pre-operational testing, operational testing, and follow-on production testing. Without this participation the proponent may find that the new device is not a good trainer, for various reasons, and thus will probably not be accepted by the "field." Difficulty in operation and failure to be "soldier proof" are common complaints against devices. Complaints against the U-COFT first centered around the limited time each crew had to train in the simulator. Another complaint concerned the requirement for the Master Gunner or Platoon Leader/Sergeant to be with the training crew, thus taking one of them away from the rest of the unit. Some commanders believed that more U-COFT's were needed in order to properly train their units, while a few questioned its value at all.

In determining device acceptability commanders play the major role. Since devices are resource savers and, if properly developed, effective trainers the only issue in determining acceptability is telling the commander how to best employ the devices. To help the commander the proponent has the responsibility to provide a Training Support Package (TSP) to assist him in planning the integration of the device into his overall training program. The TSP is a published document that may be prepared by the Army proponent or a contractor, usually the manufacturer of the device. Publishing a TSP is a recent practice and many devices have been fielded without one. In that case the proponent should now develop and recommend a strategy for incorporating the various, non-TSP supported, devices into the commanders training program. For

example there are several devices supporting Bradley Fighting Vehicle gunnery. Some may be locally manufactured and others are more complex to include the U-COFT. Because of the scarcity of time to train on the U-COFT, a training strategy should be developed to show how the other devices can fit into a comprehensive, resource saving and effective training program. Some devices support preliminary gunnery tasks very well and are attached to the weapons system during training and fire subcaliber ammunition. Only the weapons optics are used with another device. Ranges may not be necessary just because the weapons system and optics are used and motor parks may suffice for scaled range or video supported simulations. Regardless, the commander needs help in developing his program or the device, no matter how good, may not be acceptable.

The previous discussion indicates that devices are "big business," and the Army is relying heavily on them to train soldiers on some of our most critical weapons systems. There have been a few recent problems with devices, and in some cases devices may not give us the training and savings we want. There should be a system to better manage the decision to develop devices and simulators. A system exists to monitor this function, but in reality the proponents have been allowed to go relatively unchecked in seeking new and better trainers. Some devices that cross proponent lines may be ignored by one side or the other and some unhealthy and expensive redundancies are experienced. At present the Department of the Army is trying to get a handle on this and reign in the various developmental efforts.

The cost and numbers of training devices, particularly the high dollar simulators, strongly indicate that there should be close

management of their care and use. A broad and deep pitfall is the lack of use or misuse of devices. Recently, the Army Audit Agency inquired into the use of the .22 caliber rimfire adapter for the M16 rifle. This device allows for range firing with the M16 but uses the cheaper less destructive .22 caliber ammunition and can be fired on all .22 caliber ranges. The preliminary results of that inquiry showed that the rimfire adapters are not well received and are not used extensively. There were numerous declared reasons for their lack of use including, dissatisfaction with the training value of the device, better devices available and concern about possible damage to the M16 rifle. The rimfire adapter costs approximately \$60.

There are also cases of high dollar devices not being used. In a conversation with a Department of Army staff officer it was revealed that some U-COFT's are not fully scheduled for training. This is the opposite of what was initially expected. It appears that in some units the support requirements to operate the U-COFT are considered too much for its training value. It is not known if this is a cyclic phenomena, i.e., high use immediately before live fire exercises and low use after such exercises or just a commanders overall dissatisfaction with a complex, high tech simulator. The proponent believes the U-COFT is an excellent trainer and should be used every available hour. It requires intense management and involvement of the chain of command to ensure effective U-COFT training occurs but the potential results of a highly trained crew cannot be otherwise obtained in the current austere environment.

A quick look at the US Army Forces Command (FORSCOM) Five Year Training Devices Plan⁴ is very revealing in the number and complexity

of "high dollar" devices already fielded in FORSCOM units. These devices are proven trainers. They are expensive, and in some cases difficult to operate and require highly trained operators/instructors. Some or all can be issued to the TASC for short-term issuance to units for training or in the case of the U-COFT be issued permanently through the TASC to the tank and Bradley battalions. Possibly a training theatre should be instituted at certain centralized locations as has been experienced in Europe in order to properly maintain the devices, ensure their availability for critical training in certain units and ensure qualified instructor/operators. For example, a division could establish a training theatre where all the expensive and complex devices are maintained and units would schedule their people to be trained at the theatre. All that would be required of the unit would be for their people to show up on time, with the proper equipment and supervision and properly assessed training level so that training on the devices could begin immediately. Records should be maintained at the unit and the theatre to indicate individual/crew level of proficiency and other pertinent information to ensure progressive and properly sequenced training events. The technical expertise to operate the devices would be with the training theatre cadre, and unit NCO's would not be expected to know how to perform the numerous device unique tasks that ultimately have nothing to do with the operation of the weapons system. The theatre could be staffed with civilians through contract or the civilian personnel office. It may not be expected or desirable for the training theatre to conduct the more traditional unit training such as small arms firing and qualification but could best support the commanders by conducting training on the U-COFT, Tank Gunnery/Missile

Tracking System and the Artillery, Training Set, Fire Observation just to name a few.

Finally, some of the new devices and simulators are considered so critical to training and are so expensive that the result of their use should be reported as a matter of readiness. This can be done off line by a separate report through training channels or could be reported as a part of a quarterly readiness report. Some gunnery tables for tank and Bradley firing are proposed to be performed exclusively by use of the U-COFT. To ensure an audit trail on utilization and effectiveness is maintained, a report could be rendered and retained reflecting the results of the simulated table firings. Sustainment of skills through use of flight and driver simulators and device supported antitank missile qualification may also fall into this category of reportable training for readiness.

In summary, the proliferation of training devices has created a slight glut in the number of devices and a shortage of strategies for their use. The proponents, which in most cases are the service schools, should be responsible for developing a strategy for training each of their systems. That strategy should include the utilization of applicable training devices and commanders in turn should be able to use the training support packages provided by the proponent to almost "plug" the training into their overall programs. The commander should continue to be held responsible for the training status of his unit, but in some cases he should be directed to use the highly expensive and proven devices and simulators, and the results of the use of these devices should be made a matter of record.

Specifically, TRADOC should compile and publish a consolidated list of all training devices and simulators. A good format for that list would be that used by FORSCOM for their Five Year Training Devices Plan (Figures 1-2). Each proponent should then be required to publish a strategy for training each weapons system and identify the supporting training devices/simulators to include when and where employed in the training. A periodic review of all devices should be made to scrub those not needed and they should be removed from the inventory. And in the future all proposed devices should address a training shortfall and fit an existing training strategy or a proposed strategy. Additionally, the Department of the Army should review all high cost devices that train to such a fidelity that a qualification can be determined from that training and consider requiring a regular readiness report on their use and training results.

The Department of the Army has published Circular 350-85-4, Standards in Weapons Training Circular (STRAC) which,

contains policy and procedures for planning, executing, and resourcing training. It includes weapons qualification standards, suggested training programs and ammunition requirements for the attainment and sustainment of weapons proficiency.⁵

The circular further states that the included programs incorporate training devices and simulators, which is true, but is not inclusive of all devices and simulators. The original Standard in Weapons Training Circular was not well received in that many commanders perceived that their units would be losing ammunition needed for training and qualification, thus adherence to STRAC would lower their readiness posture. What actually occurred was a realization that when properly

administered the requirements of STRAC were greater than many units could afford both in time and facilities. This, points out another reason for TRADOC, FORSCOM, service schools, etc., to better articulate what is available and how to use it. At present, STRAC is an initial attempt to articulate a comprehensive strategy for weapons training incorporating devices. It falls well short of the mark in it's present form.

Trainers should be prepared to use devices more and more in the future. Maintenance trainers are now available that allow for example, faults to be programmed into electrical systems, which can only be corrected when the student completes all required diagnostic checks and actually fixes the problem. This frees up the actual equipment and precludes unnecessary damage. Also, with the advent of the futuristic SIMNET, a system of combat vehicle simulators are networked so that crews and units can realistically simulate battlefield tasks. SIMNET is presently being installed at Fort Knox and will next be installed at Fort Benning. Its first use will be to support combat, training, and doctrine developments and in the future may be used for training units. Each proposed site will have simulators representing a battalion task force and each vehicle module will simulate a M1 or M2/3 vehicle with all crew stations. The simulated imagery for the crews will be computer generated and the networking will allow opposing and friendly vehicles to simulate seeing each other, driving over terrain and engaging in battle. A battalion staff exercise is also included in SIMNET.

While devices are not a total panacea to the training and resource dilemma, they can provide tremendous support to the commander. On the other hand, without proper development, management, and a well articulated strategy for training, they may become distractors rather than training enhancers.

ENDNOTES

1. US Department of the Army, US Army Infantry School Regulation (Proposed): Fort Benning, Georgia: undated.

2. Ibid.

3. US Department of the Army, FORSCOM Five Year Training Device Plan, pp. 3-26d--3-27, Fort McPherson, Georgia: 1 January 1984.

4. Ibid.

5. US Department of the Army, Circular 350-85-4, Standards in Weapons Training. Washington: 16 September 1985.

CURRENT AS OF: 31 December 1983

CATEGORY: DEVICES COMMON TO MORE THAN ONE BRANCH

DEVICE: UNIT CONDUCT OF FIRE TRAINER (U-COFT)

SYSTEM: BRADLEY FIGHTING VEHICLE M2/M3

1. DESCRIPTION:

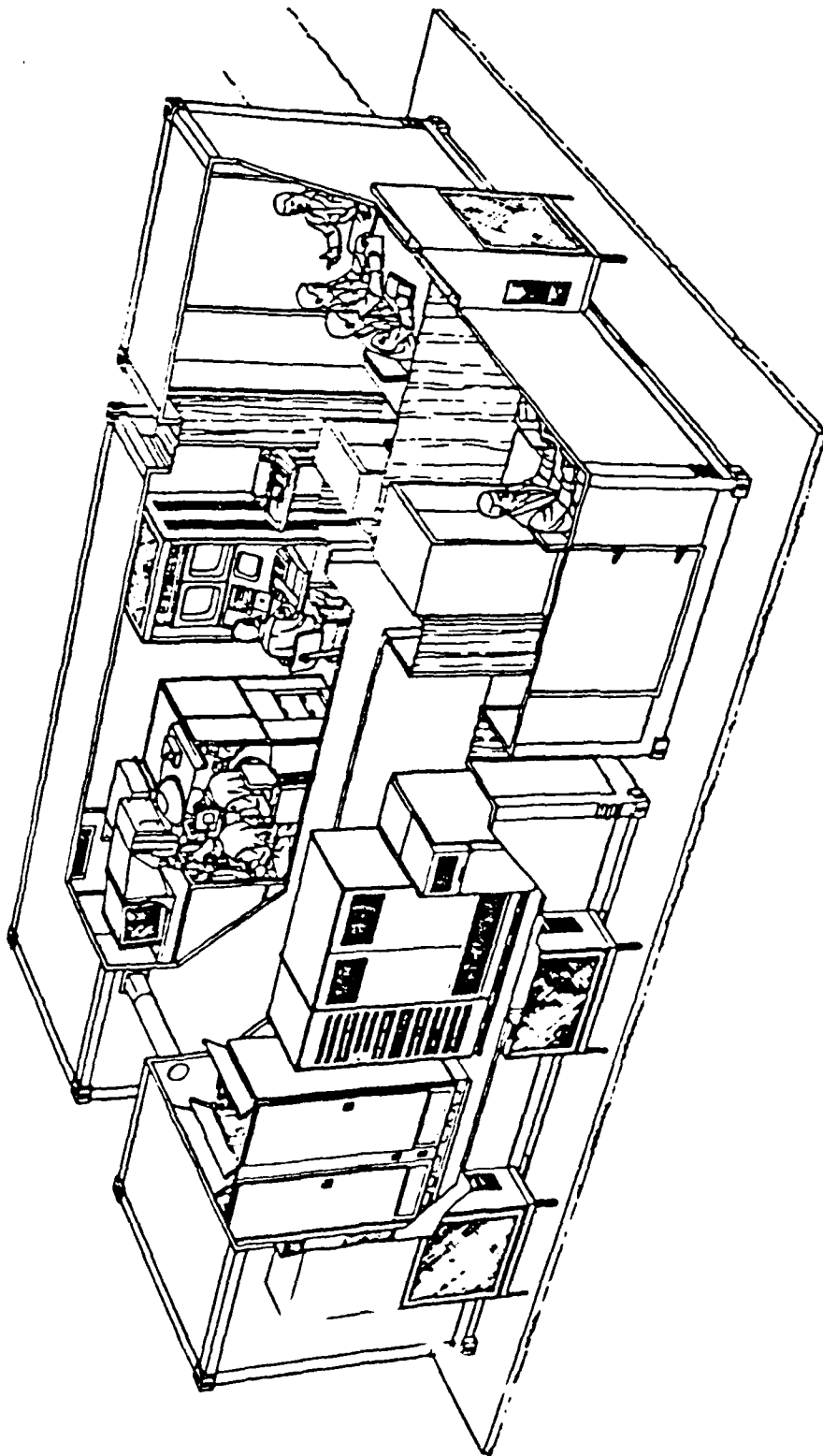
The Bradley Fighting Vehicle (BFV) Unit Conduct of Fire Trainer (U-COFT) will provide training in target acquisition and engagement with the 25mm cannon, coax machinegun and TOW. The BFV U-COFT will consist of a full-size crew station with track commander and gunner positions, a visual display system, instructor's station and a computer system. The U-COFT will duplicate the interior configuration of the track commander's and gunner's positions. The controls and indicators will be located in the same positions and perform the same functions as in the operational vehicle. The instructor's station will provide the ability to monitor and control the operations of the track commander and gunner. Training programs will consist of a variety of procedure exercises and simulated training scenarios requiring system start-up and checkout; acquisition of targets; tracking and ranging; and engagement of various types of targets, stationary and moving. U-COFT will be housed in self-contained shelters. Estimated cost is \$2M per trainer.

2. FACILITIES:

Special facilities are required. Trainer Facilities Report for Shelterized U-COFT, dated 15 Apr 83, ARRADCOM No. 12710328, has been provided to installations receiving U-COFT. It contains both installation and contractor requirements for site preparation.

3. See picture: Page 3-27b.

TNG TASK	FORSCOM FIELDING (FY)	BOIP	REC ORG	LOG SPT	REMARKS	
					Inst	Contract
COLL	4Q85	See page 3-27a				Distribution is being revised to coincide as closely as possible to BFV delivery schedule.



Unit-Conduct of Fire Trainer

3-27b

FIGURE 2

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